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ROSWELL CARTER WILLIAMS, JR.

ENTOMOLOGICAL NEWS

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Roswell Carter Williams, Jr.

Mr. Williams was born in Brooklyn, New York, on August 21st, 1869 and died in Philadelphia, Pennsylvania, on March 7th, 1946. He was in his seventy-seventh year. He attended the Adelphi Academy in Brooklyn, graduating with a B.S. degree, and then entered Cornell University from which he graduated in 1892 with an M.E. degree. He was associated with Charles P. Steinmetz in the development of the "Three Phase Power Transmission" experimental work. He removed to Philadelphia and about 1896 entered the electric engineering and contracting firm of J. F. Buchanan & Company as a partner, and remained a member of that firm until his retirement from business in 1918.

In World War I, Mr. Williams volunteered for war service and received the appointment of Captain in the Ordnance Department. He was appointed by Congress on the Board of Adjustment to represent the Government at Nitro, West Virginia and served throughout the war.

Mr. Williams was long very much interested in natural history, especially in the study of Lepidoptera, and for many years up until the time of his death was actively associated with the Academy of Natural Sciences of Philadelphia and with the American Entomological Society. He was elected an annual member of the Academy on November 26th, 1901, became an Associate Sustaining Member on February 21st, 1928, and a Sustaining Member on January 16th, 1929. He served as a member of the Scientific Council of the Academy from December, 1920, until his death. He was Chairman of the Committee on Accounts of the Academy from December, 1922, to

October, 1924, when through a reorganization of the operations of the Academy the Committee was discontinued. In 1922 he was elected by the Council of the Academy to the post of Research Associate in the Department of Entomology which he held to the time of his death.

Mr. Williams was elected a member of the American Entomological Society on March 25th, 1915 and served three periods as its Recording Secretary, i.e. 1916–1918, 1920, and 1922–1924. He was President of the Society the years 1926 to 1935 and as ex-President was a member of its Council up to the time of his death. At various times he served as a member of the Society's Finance Committee and of its Publication Committee.

In his studies of Lepidoptera, Mr. Williams was principally interested in the family of butterflies known as the Hesperiidae, and about these published numerous papers and described for the first time many species new to science. He was particularly interested in these butterflies from the tropical regions of America, but also did considerable work with those of the North American fauna. He had many correspondents in Central and South America who sent him specimens from various countries. His earliest publication known to the writer was in ENTOMOLOGICAL NEWS, XXV, 1914, in which he described a new form of hesperid.

For several years up to the time of Dr. Henry Skinner's death in 1926, Mr. Williams worked intimately with him and collaborated with him in writing a comprehensive work on the male genitalia of the North American Hesperiidae, illustrated by drawings from nearly all the then known species occurring north of the Mexican border, and with the description of a new species. Under the title of "On the Male Genitalia of the Hesperiidae of North America" their work was published as a series of papers in the Transactions of the American Entomological Society, XLVIII, 1922–1923, XLIX, 1923, and L, 1924. These are the first and only publications of this kind dealing entirely with the North American species of Hesperiidae. The illustrations and much other data provide great assistance to students of these butterflies.

Mr. Williams was keenly interested in the study of the male genitalia of Hesperiidae as a means of certain identification of species and most of his works are well illustrated with drawings of these structures. He published his "Studies in the Neotropical Hesperiidae" in the Transactions of the American Entomological Society in two parts, LII, 1926 and LIII, 1927, the first part dealing with the genus *Eudamus* and the second part with several other genera. These papers contain descriptions of several new species and one new genus and a great deal of data on various other species and include drawings and two plates in each part of very exact and beautiful figures in natural color of the insects themselves. He also published in the Transactions, LVII, 1931, a paper entitled "Two New Hesperids from Ecuador" illustrated with drawings and colored figures of the two species. He also published another paper entitled "A New Hesperid from Mexico" in the Transactions, LIX, 1933, with a plate of black and white figures.

In 1929 a small group of collectors, in which Mr. Williams participated, sent Mr. Orazio Querci to Cuba to collect Lepidoptera, and on the Hesperiidae taken on this expedition Mr. Williams published a paper in the Transactions of the American Entomological Society, LVII, 1931, entitled "Cuban Hesperiidae." This paper is illustrated with drawings, a chart showing species and dates of capture and one plate of fifteen figures of butterflies in their natural color.

Mr. Williams joined with Dr. A. W. Lindsey and the writer in compiling a revised edition of "The Hesperioidea of North America," which was published in the Denison University Bulletin, Journal of the Scientific Laboratories, XXVI, 1931.

Mr. Williams and the writer worked together on many problems concerning the American Hesperiidae and jointly published several papers which appeared in the Transactions of the American Entomological Society. These papers are "Short Studies in American Hesperiidae," LVI, 1930; "Studies in the American Hesperioidea," in four parts, LIX, 1933, LX, January, May and September, 1934; "New Species of Pellicia with Remarks on the Genus," LXV, 1939; "New Neotropical Hes-

periidae and Notes on Others," LXVI, 1940, all of which are illustrated with drawings.

In 1926 Mr. Williams participated in organizing an expedition to the Guianas to collect insects, and early in 1927 Dr. W. T. M. Forbes of Cornell University and his associate Dr. P. P. Babiy were sent to Dutch and British Guiana with short stops in some of the West Indies. They spent several months collecting and on the Hesperiidae taken by them a joint paper was published by Mr. Williams and the writer entitled "Hesperiidae of the Forbes Expedition to Dutch and British Guiana." This paper appeared in the Transactions of the American Entomological Society, LVII, 1931, and in it several new species are described and it is illustrated with many drawings and one plate of colored figures.

Mr. Williams and Mr. Kenneth J. Hayward, of Tucuman, Argentina, jointly compiled the "Hesperiidarum Rei Publicae Aequatoris Catalogus" published at Tucuman in De Acta Zoologica Lilloana del Instituto Miguel Lillo, II, 1944. In this work they presented a catalogue of all the known species of Hesperiidae occurring in Ecuador, with a long bibliography and details of the localities from which the insects came. To the writer's knowledge, Mr. Williams spent a great deal of time over several years in research and in compiling the information for this catalogue from the large amount of Ecuadorean material in the collection of the Academy of Natural Sciences.

Two weeks before his death Mr. Williams completed assembling specimens of butterflies for a map showing their distribution in the United States, which has been published in the July issue of the "Holiday" magazine and this, his last contribution to the Science of Entomology, is a tribute to his many years of interest in it.

The writer's own intimate friendship with Mr. Williams began nearly twenty-five years ago while he was working with Dr. Skinner on their papers, and over this long period of years it was always of the greatest pleasure to work with him on problems of mutual interest, much of it done by correspondence, but many very happy hours were spent with him and his family at

their home and with him at the Academy of Natural Sciences. He was a cheerful, courteous, unassuming man, a loving husband, a devoted father, a loyal friend, a patriotic, upstanding citizen of his Country; he was "Roz" to his host of friends and by them his memory will be cherished so long as they live.

Surviving him are his wife, Carrie Hamsher Williams, and four sons: Roswell Carter III, Hamilton, Arthur P., Lieutenant Charles M., U.S.N.

ERNEST L. BELL

Notes on an Amphibious Cockroach from the Republic of Panama

By H. H. CROWELL, Assistant Entomologist, Oregon Agricultural Experiment Station, Corvallis

While dipping for mosquito larvae in a lagoon of the Rio Chilibre near the Panama Canal Zone boundary in January, 1944, the writer found the nymph of a medium-sized roach. The insect was, at first glance, thought to be an hemipterous water bug, since it was swimming rapidly around in the dipper beneath floating scraps of vegetation. It was transferred to a jar of water and taken alive to the writer's home in Ancon, Canal Zone. A battery jar aquarium was fitted out with the floating aquatic plants *Piaropus crassipes* (water-hyacinth) and *Jussiaea natans*, which were the predominant plants in the lagoon. Food, in the form of "Pablum" (baby food—known to be eaten readily by certain household roaches), was offered to the nymph by floating it on sections of cork. Both the "Pablum" and the small round leaves of the *Jussiaea* were fed upon, but not while the roach was under observation.

About two weeks after its capture, the roach molted into an adult, winged female. The nymphal skin was not found, so it was assumed that it had been eaten—a common procedure for roaches. During the time the roach was under observation in the aquarium, it was induced several time to submerge, voluntarily, by passing the shadow of one's hand over it or by touching it lightly with the end of a pencil. When disturbed, the

roach (both in the nymphal and in the adult stages) dived into the water from the floating vegetation and swam around the jar rapidly for a minute or two well below the surface of the water. If not disturbed further, the roach clung to the dangling roots of the aquatic plants and remained quiescent for as long as fifteen minutes, on two occasions, before climbing to the surface and thrusting forth its antennae and head. In this position it often remained quiescent for five or more minutes before emerging completely. When the roach was quiet under the water, a large bubble of air could be seen trapped beneath the pronotal shield.

The adult specimen was sent to the National Museum and was identified by Dr. H. K. Townes as *Epilampra abdomen-nigrum* (DeG.). Subsequent mosquito collecting trips to the Chilibre lagoon revealed no additional specimens of this species in the aquatic vegetation. One specimen of an unknown species was dipped on one trip, but it escaped before it could be transferred to a suitable container.

Since returning to the United States the writer has received some very interesting information concerning the amphibious habits of roaches from correspondence with Mr. James A. G. Rehn, Curator of Insects at the Academy of Natural Sciences of Philadelphia, and Dr. Ashley B. Gurney, Entomologist with the Division of Insect Identification in Washington. Dr. Rehn was very familiar with this species, having had considerable to do with clearing up its much involved synonymy and working out its distribution. *Epilampra abdomen-nigrum* occurs from southern Mexico to Amazonia and through the Lesser Antilles, Jamaica and Puerto Rico. Although this species has been collected on the mainland more abundantly, probably, than any other species of the genus, the amphibious life habits have not been specifically noted for it or for any other related form from Panama. Aquatic habits have been noted, however, for other species of *Epilampra* and relatives of the genus since 1900, when Annandale recorded observations on adults of a Malayan species of *Epilampra*. Since then there have been a number of recorded observations of amphibious habits in blattids from both the Eastern and American tropics, largely in genera of the family Epilamprinae.

Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part VI

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts

The preceding part under this title was published in Entomological News, 57: 65–71, 1946. At this time I am characterizing three further species from California and Idaho, all belonging to the major genus *Tipula*. Acknowledgement for these specimens is given under the individual species.

Tipula (Oreomyza) inyoensis new species

Belongs to the *borealis* (*unca*) group; mesonotal praescutum yellow, with four more reddish brown stripes, the intermediate pair approximated or confluent in front; posterior sclerites of notum chiefly yellow; pleura and pleurotergite entirely yellow; femora yellow, the tips narrowly and weakly darkened; wings with a strong brownish tinge, more yellowed on basal third, without clearly defined pattern; basal abdominal segments chiefly yellow, the outer ones more darkened; ninth tergite with the median portion produced, its margin gently emarginate, on either side beneath with a slender blackened rod; inner dististyle with the beak unusually slender, blackened, extended straight backward into the dorsal crest; lateral appendage very reduced, somewhat as in *madera*, without a pendulous lower process or a claw-like middle one; upper process a conspicuous blackened clavate lobe; gonapaphysis appearing as a flattened blade.

♂. Length about 15 mm.; wing 13 mm.; antenna about 5.2 mm.

♀. Length about 15 mm.; wing 12.2 mm.

Frontal prolongation of head obscure yellow, paler beneath; nasus very long, tufted with long black setae; palpi obscure testaceous yellow, the terminal segment more infuscated. Antennae (male) long; scape, pedicel and extreme base of first flagellar segment obscure yellow, remainder of flagellum black,

the extreme bases of the more proximal segments paler; flagellar segments elongate, gently incised, longer than any of the verticils. Head above brownish gray, clearer gray in front, more yellowed behind; posterior vertex more infuscated, with a vague darker median vitta.

Pronotum infuscated medially above, obscure yellow on sides. Mesonotal praescutum with the ground color yellow, with four more reddish brown stripes, the intermediate pair approximated or confluent in front, obliterating the central pale vitta; outer borders of both intermediate and lateral stripes vaguely bordered by darker; scutum yellow medially, the lobes extensively grayish brown; posterior sclerites of notum chiefly yellow, the scutellum with a capillary brown median vitta, this less evident on the scutum; mediotergite more reddened on sides of posterior third. Pleura and pleurotergite yellow, unpatterned. Halteres with stem yellowish brown, the extreme base yellow, knob infuscated. Legs with the coxae and trochanters yellow; femora yellow, the tips narrowly and weakly darkened, most evidently so on the outer face; tibiae obscure brownish yellow, the tips narrowly darkened; tarsi black, basitarsi restrictedly paler on proximal portions; claws hairy, simple. Wings with a strong brownish tinge, more yellowed on basal third, without clearly defined pattern, the prearcular and costal fields most evidently so; stigma brownish yellow, vaguely bordered by darker; a scarcely evident pattern in the basal cells, particularly *M* and *Cu*; obliterative areas restricted; veins brown, paler in the more brightened fields. Venation: *Rs* long, about three-fourths longer than *m-cu*; R_{1+2} entire; *m* about twice the petiole of cell M_1.

Abdomen chiefly yellow on basal segments, the outer ones more suffused, on the subterminal segments the sublateral portions more darkened; hypopygium chiefly yellowish brown on tergite and styli, the eighth sternite pale. Male hypopygium with the median portion of the ninth tergite slightly produced, its caudal margin gently emarginate; from the lower surface on either side arises a slender blackened rod. Outer dististyle flattened, its apex truncate. Inner dististyle with the beak un-

usually slender, blackened, extended straight backward into the dorsal crest; lower beak very deep, its upper outer angle more blackened and produced into a short point; dorsal crest with numerous setae, on the outer face more emarginate and produced into a conspicuous lobe that is tufted with a few long setae. Lateral appendage very reduced, somewhat as in *madera*, without a pendulous lower process or a claw-like middle one; upper process a conspicuously blackened clavate lobe, its tip obtuse; lower angle merely triangular, not at all produced, entirely pale. Gonapophysis appearing as a flattened blade, the tip narrowed abruptly into a small obtuse lobule. Eighth sternite very shallowly incised to form three low lobes that are only sparsely hairy, the central one especially so.

Habitat.—CALIFORNIA. *Holotype:* ♂, Camp Manzanar, Inyo County, altitude about 3700 feet, July 1–6, 1945 (Joe M. Mayeda); through Dr. John A. Comstock. *Allotopotype:* ♀; *paratopotype,* 1 ♂.

The present fly is one of the interesting species collected by Mr. Mayeda in the vicinity of Camp Manzanar and kindly presented to me by Dr. Comstock. This is a very distinct species in an unusually difficult group, in its almost unpatterned wings somewhat resembling *Tipula* (*Oreomyza*) *appendiculata* Loew (*derelicta* Dietz, *stalactoides* Doane), differing very evidently in the structure of the male hypopygium, particularly the reduced lateral appendage. In this last respect it most resembles *T.* (*O.*) *madera* Doane, which is one of the largest species in the group, with the wing pattern especially heavy and distinct.

Tipula (Lunatipula) alcestis new species

Belongs to the *barbata* group; allied to *accurata*; wings with a brownish tinge, the obliterative area before cord extensive, virtually crossing the wing; remaining cells not conspicuously streaked with whitish; male hypopygium with the lobes of the ninth tergite obliquely truncated; beak of inner dististyle stout, outer basal lobe broad; gonapophysis dark-colored, terminating in an acute spine; eighth sternite with the median plate small, compressed-flattened.

♂. Length about 11–11.5 mm.; wing 13–13.5 mm.; antenna about 3.5 mm.

♀. Length about 14–15 mm.; wing 13 mm.

Described from alcoholic specimens.

Frontal prolongation of head brown, darker above; nasus elongate; palpi dark brown, terminal segment somewhat paler. Antennae with scape and pedicel yellow, the former a little darker at proximal end; basal two flagellar segments weakly bicolored, the remainder uniformly brownish black; flagellar segments only feebly incised, longer than the verticils. Head brown.

Thorax brown, variegated with darker brown, including broad praescutal stripes and a single major darkening on either scutal lobe; postnotum chiefly darkened; scutum and scutellum with a darkened capillary median vitta. Pleura with the mesepisternum dark brown, the mesepimeron and metapleura paler, variegated with brown. It is probable that in dry specimens the surface is more or less pruinose. Halteres with stem yellow, knob brown, its apex paler. Legs with the coxae brown; trochanters yellow; femora brownish yellow, the tips narrowly blackened; tibiae yellow, still more narrowly darkened at tip; tarsi obscure yellow, passing into black. Wings with a brownish tinge, the prearcular and costal fields a trifle more yellowed; stigma darker brown; cells beyond cord more strongly infuscated, especially in the outer radial field; small brown spots at origin of *Rs* and over the anterior cord; obliterative area before cord extensive and conspicuous, virtually crossing the wing along vein M_4, slightly broken at end of *Rs*; poststigmal pale area likewise conspicuous, including parts of cells Sc_2, R_2 and R_3; pale streaks along veins virtually lacking, most evident as vague lines in cells *Cu* and *1st A*; veins brown. Venation: *Rs* relatively long, from about one and one-half to nearly two times *m-cu*, longer than in *accurata*. In this latter species, the wings are more conspicuously variegated by paler, involving virtually the entire wing and appearing chiefly as broad streaks along the veins, excepting in the outer radial field.

Abdomen with the segments chiefly yellow, the tergites trivittate with brown, the lateral pair more broken; on the fourth and succeeding segments the color more uniformly dark brown; hypopygium chiefly yellow. Male hypopygium having the ninth tergite with broad lobes, obliquely truncated and less pointed than in *accurata;* median notch a trifle wider. Appendage of ninth sternite smaller, oval, with long dark-colored setae. Outer dististyle long and slender. Inner dististyle with the beak much stouter than in *accurata,* sloping upward to the dorsal crest; outer basal lobe broader than in *accurata.* Gonapophysis dark-colored, relatively long, produced into a slender spine on side near apex. Eighth sternite with the median plate small, compressed-flattened, not rectangular, as in *accurata.*

Habitat.—IDAHO. *Holotype:* ♂, alcoholic, Humphrey, Centennial Mts., Clark Co., along Route 91, altitude 6,500 feet, August 20, 1941 (Stanley B. Mulaik). *Allotopotype:* alcoholic ♀. *Paratopotypes:* 1 ♂, 1 ♀, alcoholic.

I am greatly indebted to Mr. Stanley B. Mulaik for the present material and other interesting Tipulidae from Colorado, Idaho and Utah. The most similar described species is *Tipula* (*Lunatipula*) *accurata* Alexander, which differs conspicuously in the wing pattern and in several important details of structure of the male hypopygium, including the tergite, inner dististyle, gonapophyses and eighth sternite.

Tipula (Lunatipula) zelotypa new species

Size relatively small (wing, male, 12 mm.); mesonotal praescutum gray, with four entire brown stripes; antennae with scape and pedicel yellow, basal flagellar segments weakly bicolored; femora obscure yellow, the tips narrowly and weakly infuscated; claws (male) simple; wings with a weak brown tinge, sparsely spotted with darker brown; a virtually complete obliterative band at and before cord; no trichia on squama or in wing cells; male hypopygium with the ninth tergite having a broad shallow V-shaped notch, the low lobes heavily blackened; basistyle produced caudad into a very thin scooplike blade; dististyle compact, beak obtuse; two spinelike points on style, one

behind the beak, the other in the region of the posterior crest; outer basal lobe a strong curved arm, unequally bifid at tip; eighth sternite with its caudal border very slightly produced, provided with numerous pale setae that are directed caudad, not arranged in brushes or pencils.

♂. Length about 12 mm.; wing 12 mm.; antenna about 4 mm.

Frontal prolongation of head brownish yellow, the dorsal surface sparsely dusted; nasus elongate; palpi with basal three segments brownish yellow, terminal one blackened. Antennae with the scape and pedicel yellow; first flagellar segment obscure brownish yellow; succeeding segments weakly bicolored, the small basal swellings brown, the apices paler, the outer segments more uniformly dark brown. Head above light gray, more yellowed on the occipital region; a short brown median vitta on the posterior vertex; vertical tubercle low, entire.

Pronotum brownish gray. Mesonotal praescutum gray, with four narrow entire brown stripes, the intermediate pair separated by a ground vitta of more than one-half their width; lateral stripes slightly broader; humeral region narrowly bordered by dark brown; posterior sclerites of notum testaceous brown, the scutal lobes and median region of scutellum patterned with somewhat darker brown; pleurotergite pruinose. Pleura pruinose behind, the anterior portion somewhat more variegated with darker, especially on the anepisternum and ventral sternopleurite; dorsopleural membrane yellow. Halteres yellow, knob weakly darkened. Legs with the coxae yellow, sparsely pruinose, the fore pair a little darker; trochanters yellow; femora and tibiae obscure yellow, the tips narrowly and weakly infuscated, the latter more narrowly so; tarsi light brown, passing into black outwardly; claws (male) simple. Wings with a weak brownish tinge, heavier along the veins beyond cord; stigma small, pale brown, inconspicuous; obliterative band before cord large, extending from before stigma to the posterior border along vein M_4, involving less than the proximal half of cell *1st* M_2; veins brown. No squamal setae; no trichia in wing cells, including the stigma; veins beyond cord with relatively abundant long trichia. Venation: *Rs* a little

less than twice *m–cu*; R_{1+2} entire; *m* oblique, longer than the petiole of cell M_1; M_{3+4} little more than one-half the basal section of M_{1+2}; cell *2nd A* broad.

Abdominal tergites obscure yellow, trivittate with brown, the median stripe broad and distinct, narrowly interrupted at the posterior borders of the segments; lateral areas much broken, becoming more distinct on the outer segments; basal sternites yellow, the outer segments darker but this apparently caused by discoloration; hypopygium chiefly pale. Male hypopygium with the tergite having a very broad and shallow V-shaped emargination, the low lobes heavily blackened; median region with a microscopic lobule; outer apical portion of lobe with an indistinct blackened point or carina. Appendage of ninth sternite a small lobe provided with numerous short pale setae. Basistyle produced caudad into a flattened, very thin, scooplike blade. Dististyle with the beak very stout and obtuse, the lower beak lacking; dorsal crest scarcely elevated; region of posterior crest produced into a short spinelike lobe; on face of style behind the beak with an even smaller reddish spine; what appears to be the outer basal lobe is a curved arm, unequally bilobed at tip, the axial spine larger, the subapical one evidently variable in size; apical portion of arm with numerous setae. Aedeagus stout but simple; gonapophyses reduced. Eighth sternite transverse, the central area of the posterior border very slightly produced, provided with numerous long pale setae that are not arranged in brushes or pencils.

Habitat.—CALIFORNIA. *Holotype:* ♂, Brawley, Imperial County, altitude 109 feet below sea-level, April 5, 1935 (A. L. Melander); Alexander Collection, through kindness of Dr. Melander.

The present isolated fly shows some points of resemblance to *Tipula atrisumma* Doane, which I have referred to the subgenus *Lunatipula* Edwards. In all other respects, the hypopygium and general appearance of the two flies is quite distinct. It may be found that *zelotypa* is more properly to be considered as being a *Trichotipula* but, if so, it deviates in many respects from the hitherto accepted characters of the subgenus.

Relative Toxicity of DDT Aerosols to Mosquitoes and Musca Domestica. Insect Balance [1]

By Frank Brescia, College of the City of New York, Victor K. LaMer, Irwin B. Wilson, John C. Rowell, Kenneth C. Hodges, Columbia University, New York City

Resolution of the well founded fear of an unbalanced insect world that may result from the use of DDT over large tracts of land (1, 2, 3, 4) requires information on the relative susceptibility of the various insects to DDT. Such a quantitative laboratory study will indicate what other insects will be effectively controlled during control operations for any given insect.

Control of the natural population of salt marsh mosquitoes up to 5000 feet downwind in open country under favorable meteorological conditions was obtained (5) with an output of 15 gallons of emulsion (50 per cent water–50 per cent oil by volume; DDT content being 10 per cent of the weight of the oil) per 1000 feet of front covered with the Insecticidal Aerosol Generator developed at Columbia University. This dosage is equivalent to 5 pounds of DDT per 1000 feet of front. It was also found that an area cleared of anopheline adult mosquitoes remained relatively free of such adults for several days. This protective period cannot be attributed to the deposited DDT but very probably to a low rate of infiltration.

Several insects of medical and economic importance were also subsequently used as test insects. The results obtained emphasize that the dosage recommended (above) for mosquito control operations is not equally effective against other insects and that *with this comparatively small and controlled dosage,* the possibility of appreciable disturbance of the natural insect balance, resulting from general insect destruction, appears to be remote.

[1] This paper is based on work done for the Office of Scientific Research and Development under O.S.R.D. contract OEMsr 1388 with Columbia University.

Field experiments in which *Musca domestica*, suspected to be an important factor in the transmission of infantile paralysis, were exposed to several dosages using the aerosol generator are presently reported. The results indicate that the adult fly is 4 to 6 times more resistant than the adult (salt marsh) mosquito.

Fly technic. Pupae, obtained from the Entomological Testing Laboratory, New York City, were placed in each of several cages (brass netting) with a cotton wad wetted with a sugar solution. Emergence was produced by keeping the cages at about 85° F. under conditions of high humidity.

Shortly before the field experiment, fresh cotton wads with sugar solution were introduced into the cages and the cages placed in large screw cap bottles which contained a wad of cotton saturated with water.

When not being exposed to the aerosol or to the wind in the case of some checks, the fly cages were kept in the jars.

At the time of the test, the flies varied in age from 3 to 30 hours, most of them being at least 24 hours old.

Experimental procedure. Cages of flies were exposed to the aerosol in open country for different intervals of time at 3 different distances, 100, 500, and 1000 feet, downwind.

The generator was stationary but the equivalent dosage (gals. per 1000 feet) of a moving test was calculated from the generator output (gals./min.), exposure time (from 2 to 20 minutes depending on distance) and spread (feet) of the aerosol at each distance. The mass particle diameter was 16 microns; the wind velocity 9 miles per hour.

Four check cages were placed upwind of the generator. Three cages were exposed to the wind for various periods; the fourth was kept within the jar. Two additional check cages were kept in the laboratory.

Results and discussion. Within 2 hours after exposure to the aerosol, all flies were knocked down and a few were dead, except in one cage which had been exposed to an equivalent dosage of 4.7 gallons of emulsion per 1000 feet of front at a distance of 1000 feet downwind. In this cage only one fly was down while 15 were active. All flies were down in another

cage at the same distance and exposure. The check cages showed a 10 per cent knockdown. Mortality data for the 1000 foot distance are given in Table 1.

TABLE 1. Mortality Data for Several Dosages of DDT Aerosol at 1000 Feet Downwind and for Controls. May 5, 1945

Equivalent Dosage in Gallons of Emulsion per 1000 Feet of Front	Number of Flies	% Dead
4.7	16	12
4.7	11	9
6.1	13	55 (1)
14	19	95 (1)
14	23	91 (1)
24	27	100
24	26	100
Check Cages Exposed to Wind. Minutes	**Number of Flies**	**% Dead (2)**
50	17	6
50	27	22
120	9	11
0	17	16
0	12	0

(1) Living flies were on their backs.
(2) Those flies which were living but were on their backs were counted as dead.

The data show that an output of about 15 gallons of the emulsion per 1000 feet of front will be required to effect adult housefly control to 1000 feet downwind. Comparing this data with the mosquito data (given in the introduction), it can be concluded that an adult housefly is 4 to 6 times more resistant than an adult salt marsh mosquito. To obtain a more accurate comparison, quantitative laboratory studies are required. It can, however, be definitely stated that the same extent of control against mosquitoes and flies will not be effected for a given DDT output. This will be also true, of course, of other insects and other forms of life more resistant to DDT than the mosquito. It appears very probable, therefore, that the projection

of controlled and regulated quantities of DDT used to control mosquitoes may not lead to any serious disturbance in insect balance. The *danger will be present* when quantities greater than the recommended 5 pounds of DDT per 1000 feet of front (5) are used to obtain control over large areas by residue effects.

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Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Kuala Lumpur. From a letter recently received from N. C. E. Miller, who before the war wrote extensively on Orthoptera and Rhynchota, and was a member of the staff of the Department of Agriculture at Kuala Lumpur, Federated Malay States, we learn that following his release from internment by the Japanese for more than three years in Sumatra, he visited Kuala Lumpur and found his insect collections and library largely intact, but that the very well known and active Museum of the Federated Malay States, also at Kuala Lumpur, was no more, having been levelled in bombing. He also informed us that H. M. Pendlebury, of the Museum, and a capable entomologist, one of the authors of "The Butterflies of the Malay Peninsula," who also took a major part in the most recent zoological exploration of Mt. Kina Balu, in Borneo, had been released from internment only to die in India from the effects of malnutrition and starvation.

The Hoffman Collection. The American Museum of Natural History has recently received, through the generosity of Mr. Frank M. Johnson, the Carlos C. Hoffmann collection, consisting primarily of Mexican Lepidoptera and scorpions. Dr. Hoffmann lived in Mexico for many years and the collection, which is in magnificent condition, is the result of over thirty years of work. It contains nearly 15,000 spread Lepidoptera, mostly identified, and about as many specimens in papers. It is particularly rich in Saturniidae, Sphingidae, and butterflies of the southern two-thirds of Mexico, but includes also large numbers of small moths. .The northern part of the country is rather poorly represented in comparison with the southern portion. The scorpion collection is from the entire country, and contains seven hundred specimens.

Dr. Hoffmann was much interested in medical entomology, whence his interest in scorpions probably arose. He published several papers on Mexican scorpions, including a revision of the species occurring in that country. On Lepidoptera he published numerous papers, describing many species the types of most of which (in addition to the scorpion types) were received with the collection. His papers on Lepidoptera culminated in a series of catalogues of Mexican species of the various families.

The collection will be of great value as it is from a region where most North American collections are poor. For this reason it will make possible studies of distribution and geographical variation heretofore impossible.

Cornell University. The Department of Entomology announces the inauguration of a five year research program to study the amino acids of insects. This work is made possible by a grant from the Lalor Foundation of Wilmington, Delaware, and is being carried out in the laboratories of Insect Physiology of the Department of Entomology. The project supports two research fellows and appointments have been made for Mr. H. L. House who is on a leave of absence from the Dominion Parasite Laboratory at Belleville, Ontario, and Mr. J. J. Pratt, Jr., who has recently been discharged from the U.S.P.H.S. Initial studies will include the identification of the amino acids in insects, and the amino acid nutritional requirements of insects.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tipulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

Lepidoptera—Wanted, Hyloicus (Sphinx) and other Sphingidae in exchange for U. S. and Wisconsin Lepidoptera. Wm. E. Sieker, 119 Monona Ave., Madison 3, Wisconsin.

Hymenoptera-Aculeata (except ants and bees) and **Ichneumonidae** for exchange or purchase. Will collect any order in exchange. D. G. Shappirio, 4811 17th St., NW, Washington 11, D. C.

Wanted—Oriental Cerambycidae and Chrysomelidae for determination and research purposes: China, India, Philippines, Pacific. Will purchase from China, Assam, Burma, Siam, Formosa. Will exchange identified Chinese insects. J. Linsley Gressitt, Lingnan University, Canton, China.

Wanted—Papers on Cicindelidae of any part of the world, especially South America and Pacific. R. G. Dahl, 3225 Grand Ave., Apt. 13, Oakland 10, Cal.

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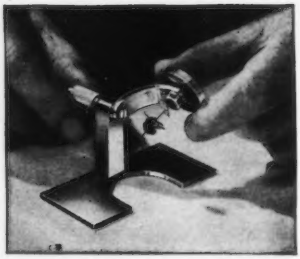

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